

## The Higher Taxa of Cowries and their Allies

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ACCORDING to the International Rules of Zoological Nomenclature (July 1958) the family group of scientific names consists of the taxa superfamily, family, subfamily, and tribus (Article 35 a). They are named after and defined by a typical genus (Art. 35 b) by appending to the root of the generic name the syllables *-idae* and *-inae* for families and subfamilies obligatorily, but *-oidea* and *-ini* for superfamilies and tribus only by recommendation (Art. 29, 29 A). The first generic name chosen to represent the typical genus of a taxon of the family group automatically becomes the typical genus of any other taxon of the family group (Art. 36); this name need not be necessarily the oldest generic name belonging to the higher taxon (Art. 64). Later established taxa of the family group become synonyms of the taxa to which the genus belongs (Art. 23 d), but it seems advisable to cite them as synonyms of the lowermost distinguished taxa only. The author of names of the family group is the writer who first used a generic name to designate a higher taxon, even if the appended syllables do not agree with the official ones named above and therefore must be emended (Art. 36). The year of this first establishing a higher taxon is to be adopted for all other taxa of the family group based on the same typical genus (Art. 36).

The following list contains the generic names used as those of typical genera of taxa of the family group of the old, well known "genera" *Erato*, *Trivia*, *Pedicularia*, *Cypraea*, and *Ovula* (= *Amphiperas*); the taxa allied to *Lamellaria*, however, have been omitted.

In the first column the generic names have been arranged in chronological order according to the date of being used as typical genus of a taxon of the family group; the second column contains the names of the authors who used them in this sense, and the year of publication of the higher taxon; the third column indicates the exact original spelling of the higher taxon's name in their papers.

(see Table 1, next page)

In past times conchologists used to place the ribbed "*Trivia*" in the genus "*Cypraea*" on account of the aperture being denticulate on both lips, and the species of *Erato* have been placed among the Marginellidae, until anatomical research showed that *Trivia* and *Erato* are

closely allied to each other, and that both exhibit affinity to Lamellariidae. Therefore the three last named groups have been united as superfamily Lamellariacea even in the Zoological Record (beginning with vol. 76 for 1939), while the superfamily Cypraeacea has been restricted to the mostly smooth "*Cypraea*" and "*Ovula*" (= "*Amphiperas*"); *Pedicularia* has been placed into Lamellariacea (Zool. Record, vol. 84 for 1947).

However, I consider it to be more advisable to separate the Triviidae from the Lamellariidae on the rank of superfamily, as the latter show no distinct siphon, united jaws, a nautiloid (instead of a helicoid) echinospira larva, biological peculiarities, and the shell being covered by a periostracum (absent in all other allies), showing a sharply edged, never inflected outer lip also in the adult stage, and no traces of teeth along the wide aperture (SCHILDER, 1936, p. 106). Therefore I suggest that "cypraeologists" should restrict their studies to the superfamilies Triviacea and Cypraeacea and exclude the true Lamellariacea as I have done in the present paper.

I think that the ending *-acea* should be retained for superfamilies in malacology as it has been generally used since the publication of THIELE's handbook (1929), because the termination *-oidea* has not been proposed as obligatory, but only as a recommendation (Art. 29 A). IREDALE (1935, p. 97), however, used the term "Cypraeoidea".

There are several rather isolated aberrant genera which possibly could deserve to be separated as higher taxa; but I consider it more advisable to place them provisionally into a well known allied taxon even if thereby it becomes difficult to find common characters to be used in the dichotomous key.

Thus the higher taxa of Triviacea and Cypraeacea may be arranged according to Table 2. This arrangement mostly agrees with the phylogenetical trees published in previous papers, especially in SCHILDER, 1936 and 1939. The predominantly Recent genera of Lamellariacea should be arranged according to THIELE (1929, pp. 262 - 267).

In Table 2 the extinct taxa have been marked with a dagger (†); synonyms have been added by foot notes. Many synonyms established chiefly by the writer himself

Table 1

Typical Genus	Author of higher Taxon	Name of higher Taxon
<i>Cypraea</i>	GRAY, 1824	Cypraeidae
<i>Ovula</i>	FLEMING, 1828	Ovuladae
<i>Amphiperas</i>	ADAMS & ADAMS, 1854	Amphiperasidae
<i>Pedicularia</i>	ADAMS & ADAMS, 1854	Pediculariidae
<i>Trivia</i>	TROSCHER, 1863	Triviacea
<i>Lamellaria</i>	TROSCHER, 1863	Lamellariidae
<i>Porcellana</i>	ROBERTS, 1870	Porcellanidae
<i>Eocypraea</i>	SCHILDER, 1924	Eocypraeinae
<i>Erosaria</i>	SCHILDER, 1924	Erosariinae
<i>Erato</i>	SCHILDER, 1927	Eratoinae
<i>Cypraedia</i>	SCHILDER, 1927	Cypraediinae
<i>Cypraeovula</i>	SCHILDER, 1927	Cypraeovulidae
<i>Simnia</i>	SCHILDER, 1927	Archicypraeinae
<i>Archicypraea</i>	SCHILDER, 1927	Simniini
<i>Gisortia</i>	SCHILDER, 1927	Gisortiinae
<i>Bernaya</i>	SCHILDER, 1927	Bernayini
<i>Cypraeorbis</i>	SCHILDER, 1927	Cypraeorbini
<i>Erronea</i>	SCHILDER, 1927	Erroneini
<i>Jenneria</i>	THIELE, 1929	Jenneriinae
<i>Amphiperas</i>	WINCKWORTH, 1929	Amphiperatidae
<i>Cypraeacites</i>	SCHILDER, 1930	Cypraeacitinae
<i>Volva</i>	SCHILDER, 1932 a	Volvini
<i>Luria</i>	SCHILDER, 1932 b	Luriini
<i>Pustularia</i>	SCHILDER, 1932 b	Pustulariini
<i>Naria</i>	SCHILDER, 1932 b	Nariinae
<i>Zonaria</i>	SCHILDER, 1932 b	Zonariini
<i>Umbilia</i>	SCHILDER, 1932 b	Umbiliini
<i>Cyproglobina</i>	SCHILDER, 1932 b	Cyproglobinini
<i>Sulcocypraca</i>	SCHILDER, 1932 b	Sulcocypraeini
<i>Zoila</i>	IREDALE, 1935	Zoilinae
<i>Staphylaea</i>	IREDALE, 1935	Staphylaeinae
<i>Austrocypraea</i>	IREDALE, 1935	Austrocypraeinae
<i>Eratotrivia</i>	SCHILDER, 1936	Eratotriviini
<i>Pusula</i>	SCHILDER, 1936	Pusulini
<i>Conocypraea</i>	SCHILDER, 1936	Conocypraeini
<i>Mandolina</i>	SCHILDER, 1936	Mandolinini
<i>Talparia</i>	SCHILDER, 1936	Talpariini
<i>Johnstrupia</i>	SCHILDER, 1939	Johnstrupiini
<i>Triviella</i>	SCHILDER, 1939	Triviellini
<i>Pseudocypraea</i>	STEADMAN & COTTON, 1943	"Subfamily <i>Pseudocypraea</i> "
<i>Adusta</i>	STEADMAN & COTTON, 1946	Adustinae
<i>Mauritia</i>	STEADMAN & COTTON, 1946	Mauritiinae

were based on the erroneous assumption that the oldest generic name must be used for the designation of the higher taxon (see Art. 64).  
(see Table 2, page 33)

It is rather difficult to construct a dichotomous key to the taxa of this family group, as they represent members of the phylogenetic tree gradually passing each into the other and terminal branches often showing parallel devel-

Table 2

SUPERFAMILY	FAMILY	Subfamily	Tribus (Infrafamily)
TRIVIACEA	TRIVIIDAE <sup>1</sup>	Eratoinae	† Johnstrupiini
TRIVIACEA	TRIVIIDAE	Eratoinae	Eratoini
TRIVIACEA	TRIVIIDAE	Eratoinae	† Eratotriiviini
TRIVIACEA	TRIVIIDAE	Triviinae	Triviellini
TRIVIACEA	TRIVIIDAE	Triviinae	Triviini
TRIVIACEA	TRIVIIDAE	Triviinae	Pusulini
TRIVIACEA	PEDICULARIIDAE		
CYPRAEACEA	CYPRAEIDAE <sup>2</sup>	Bernayinae <sup>3</sup>	† Archicypraeini <sup>4</sup>
CYPRAEACEA	CYPRAEIDAE	Bernayinae	Bernayini <sup>5</sup>
CYPRAEACEA	CYPRAEIDAE	Bernayinae	† Gisortiini
CYPRAEACEA	CYPRAEIDAE	Cypraeinae	Cypraeini <sup>6</sup>
CYPRAEACEA	CYPRAEIDAE	Cypraeinae	Luriini
CYPRAEACEA	CYPRAEIDAE	Erroneinae <sup>7</sup>	Zonariini
CYPRAEACEA	CYPRAEIDAE	Erroneinae	Cypraeovulini <sup>8</sup>
CYPRAEACEA	CYPRAEIDAE	Erroneinae	Erroneini <sup>9</sup>
CYPRAEACEA	CYPRAEIDAE	Erosariinae <sup>10</sup>	Pustulariini <sup>11</sup>
CYPRAEACEA	CYPRAEIDAE	Erosariinae	Erosariini <sup>12</sup>
CYPRAEACEA	OVULIDAE <sup>13</sup>	Eocypraeinae <sup>14</sup>	Eocypraeini <sup>15</sup>
CYPRAEACEA	OVULIDAE	Eocypraeinae	Jenneriini <sup>16</sup>
CYPRAEACEA	OVULIDAE	Eocypraeinae	† Cypraediini
CYPRAEACEA	OVULIDAE	Ovulinae <sup>17</sup>	Ovulini <sup>18</sup>
CYPRAEACEA	OVULIDAE	Ovulinae	Simniini <sup>19</sup>

Synonyms:

- |  |   |   |
|--|---|---|
| <sup>1</sup> Eratoidae                       | <sup>7</sup> Cypraeovulinae                                 | <sup>14</sup> Jenneriinae, Sulcoeypraeinae    |
| <sup>2</sup> Porcellanidae                   | <sup>8</sup> Umbiliini                                      | <sup>15</sup> Sulcoeypraeini, Pseudocypraeini |
| <sup>3</sup> Cypraeorbinae, Zoilinae         | <sup>9</sup> Adustini                                       | <sup>16</sup> Cyproglobinini                  |
| <sup>4</sup> Mandolinini                     | <sup>10</sup> Cypraeacitinae, Nariinae                      | <sup>17</sup> Amphiperatinae                  |
| <sup>5</sup> Cypraeorbini, Zoilini           | <sup>11</sup> Cypraeacitini, Austrocypraeini, Conocypraeini | <sup>18</sup> Amphiperatini                   |
| <sup>6</sup> Talpariini, Mauritiini          | <sup>12</sup> Nariini, Staphylaeini                         | <sup>19</sup> Volvini                         |
| <sup>13</sup> Amphiperasidae, Amphiperatidae |   |   |

opment of characters. Therefore there are many species and even genera which do not fit the most outstanding characters of a higher taxon, although the sum of all other characters points to close relationship to this taxon. Nevertheless, the taxa of the family groups belonging to the superfamilies Triviacea and Cypraeacea roughly may be distinguished as follows (see also SCHILDER, 1936 and 1939):

DICHOTOMOUS KEY

(R = radula; S = shell)

- 1 Osphradium semilunar, pedal ganglia short, echinospira well developed Triviacea ..... 2
- Osphradium trifold, pedal ganglia long, echinospira

- wanting Cypraeacea ..... 8
- 2 Vagile, siphon distinct, R: laterals dagger-like, S: outer lip denticulate Triviidae ..... 3
- Sessile, siphon obsolete, R: laterals trifid, S: cuplike ..... Pediculariidae
- 3 Siphon separated by a rim, S: anterior margin of the fossula free Eratoinae ..... 4
- Siphon not separated if extended, S: fossula connected with the dorsal wall in front Triviinae .. 6
- 4 S: dorsum smooth or granulate, fossula smooth or reduced ..... 5
- S: dorsum and fossula transversely ribbed ..... † Eratotriiviini
- 5 S: fossula reduced, anterior columellar teeth coarse, transverse ..... † Johnstrupiini



- S: fossula well developed, smooth (rarely denticulate within) ..... Eratoini
- 6 S: aperture wide, outer lip narrow, terminal teeth projecting ..... Triviellini
- S: aperture narrow, central, outer lip broader, terminal teeth hardly separable ..... 7
- 7 S: dorsum smooth between the ribs .... Triviini
- S: dorsum finely granulate between the ribs Pusulini
- 8 Osphradium central, large, R: laterals with coarse cusps, S: spire never involute Cypraeidae 9
- Osphradium displaced to the front, small, R: laterals flabellate, S: spire involute so that the cast shows a hole behind Ovulidae ..... 18
- 9 R: median without basal lamella, S: margins never pitted, anterior columellar teeth short, dorsum mostly freckled with brown, with several bands 10
- R: median mostly with a basal lamella, S: margins mostly pitted, anterior columellar teeth transversely extended, dorsum with white spots, with one band only Erosariinae ..... 17
- 10 S: spire mostly projecting, shell medium size to large, barely margined ..... 11
- S: spire mostly umbilicate, shell small to medium size, outer lip margined Erroneinae ..... 15
- 11 S: fossula smooth, never denticulate within, spire mostly broad Bernayinae ..... 12
- S: fossula transversely ribbed or denticulate within, spire less broad Cypraeinae ..... 14
- 12 S: medium size to large, without appendices, teeth and fossula distinct ..... 13
- S: large to gigantic, with large appendices, teeth and fossula obsolete, spire extremely broad ..... † Gisortiini
- 13 S: elongate, fossula rather reduced to absent ..... † Archicypraeini
- S: globular, fossula broadly concave .. Bernayini
- 14 R: laterals large, median smaller, S: with four bands ..... Cypraeini
- R: laterals reduced, median very large, S: trizonate ..... Luriini
- 15 S: spire slightly projecting, fossula broad Zonariini
- S: spire mostly umbilicate, fossula narrow to obsolete ..... 16
- 16 S: fossula reduced to obsolete .... Cypraeovulini
- S: fossula distinct though narrow, bituberculate ..... Erroneini
- 17 S: fossula rather broad but inner denticles obsolete, pittings obsolete ..... Pustulariini
- S: fossula narrow, but inner denticles mostly coarse, pittings mostly distinct ..... Erosariini
- 18 R: laterals narrow, with few flabella; S: columellar teeth distinct Eocypraeinae ..... 19
- R: laterals triangular with many flabella, S: columellar teeth absent Ovulinae ..... 21
- 19 S: fossula broad, smooth ..... 20
- S: fossula reduced, shell covered with fine spiral ribs ..... Cypraeidiini
- 20 S: pyriform, dorsum smooth, rarely with fine ribs ..... Eocypraeini
- S: ovate to elongate, dorsum often ribbed or pustulate ..... Jenneriini
- 21 S: pyriform, labial teeth and terminal ridge distinct ..... Ovulini
- S: fusiform, labial teeth and terminal ridge obsolete ..... Simniini

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## The Range of *Trivia myrae* CAMPBELL

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(1 Map)

A NEW MEMBER of Triviidae, *Trivia myrae*, was described by CAMPBELL (1961), who referred it to the subgenus *Pusula*. The type locality is the channel between Loreto, Baja California and Carmen Island, which lies between 5 and 10 miles offshore in the Gulf of California. The holotype and two paratypes were trawled in this locality, while seven additional specimens were trawled off Monserrate Island, Gulf of California, and two specimens were dredged off Punta Final, Baja California. It was further stated that extensive dredging at the mainland locations of Puerto Peñasco, Guaymas, Mazatlán, Salina Cruz, and El Salvador failed to produce additional specimens. The conclusion was accordingly reached that this species appeared to be limited to the eastern (*i. e.* Gulf of California) shore of Baja California.

*Trivia myrae* does not appear in a checklist of mollusks for Puertecitos (DUSHANE, 1962). This locality is on the eastern shore of Baja California, about 45 miles north of Punta Final. It is noteworthy that the collectors who contributed information used in the compilation of this checklist include the author of the species.

EMERSON & OLD (1963) then reported finding three specimens off Coronados Island and one specimen off

Puerto Escondido, and although the latter was stated to represent an extension of the range southward, Puerto Escondido is in fact *north* of Monserrate Island.

I wish to report a further range extension on the basis of two shells from Puerto Peñasco (*leg.* Nora Donohue). These were discovered in a large lot of beach *Trivia*, which consisted in the main of *T. solandri* (SOWERBY) and *T. californiana* (GRAY), collected in April, 1964. The two *T. myrae* in the lot were identified by F. A. Schilder, who referred to them (*in litt.*) as subspecific of *T. fusca* SOWERBY. There are, therefore, some taxonomic problems to be settled here, because *T. fusca* and *T. myrae* are, at present, assigned to different subgenera, viz., *Cleotrivia* IREDALE and *Pusula* JOUSSEAUME, respectively. The diagnostic difference between *Cleotrivia* and *Pusula* is, according to KEEN (1958), that in the former the rib ends in the dorsal furrow interrupting the ribs are not beaded, while in the latter the rib ends are beaded. The original description of *T. myrae* (CAMPBELL, 1961) states "as the ribs enter the dorsal sulcus, the color is lighter, giving the impression of very slight beading." The status of these two subgenera, it would seem, deserves further study.

In any case, the range extension of *T. myrae* to the mainland coast of the Gulf of California suggests that

<sup>1</sup> Contribution No. 286.